What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

CLAIMS

1. A sintered ceramic composite lead with a 3D superconductive nano-architecture comprising of:

(A) a physical-chemical phase composition consisting of:

* nano-size superconductor ceramic grains composed of crystals and forming a basic phase elements;
* additional phase elements constituting nano-thick multi-oxide silicate glass films distributed within grain boundary areas between said grains;
* further phase elements selected from at least one group consisting of nano-size dope particle, modifier particle, and impurities particle groups, and a combination thereof and said further phase elements are distributed within said grain boundary areas between said grains; **and**

(B) a three dimensional grain-cell nanostructure comprising 3D setting network and consisting of:

* said crystals with *c* - axes oriented substantially perpendicular to a direction of an electric current flux in said lead;
* said crystal grains substantially uniformly aligned in $a - b$ crystallographic planes; and
* said additional phase elements and said further phase elements caging and framing said nano-size superconductor ceramic grains and forming nano-size cells comprising said grains surrounding by said additional and further phase elements and providing settings of said grains.

2. A sintered ceramic composite lead as defined in claim 1, wherein more than 90 mass percents of said lead constitute said nano-size ceramic crystals with superconductive stoichiometry and morphology and said stoichiometry and morphology are substantially close to stoichiometry and morphology of superconductor ceramic crystals constituting ceramic particles of the raw ceramic powder, which is used as the basic part of the lead material formulation.

3. A sintered ceramic composite lead as defined in claim 1, wherein said lead is chemically stable and durable in liquid nitrogen and air environments for more than five years when said lead is unprotected, and said lead repeatedly demonstrates substantially same electric current carrying capability.

4. A sintered ceramic composite lead as defined in claim 1, wherein said lead is formed as an adhesion substrate coated and than sintered surface element with a surface layer thickness 2 – 20μm and formed as an element selected from the group consisting of a flat or a curve surface, a drawing, a picture, an image, a tape, a coil, a printed circuit, a surface coating filament or a strand substrate, and a combination of at least two of said elements.

5. A sintered ceramic composite lead as defined in claim 1, wherein said lead is a three-dimensional structural element selected from the group consisting of a ribbon, a coil, a rod, a ring, a disc, a tablet, a long-length structure, a large-size structure, a small-size structure, a

beam, a tube, a cylinder, a rail, a cone, a ball, a multi-layer structure, and a combination of at least two of said elements.

6. A sintered ceramic composite lead as defined in claim 1, wherein said lead is formed as a combination of a coating and a three-dimensional structural element.

7. A sintered ceramic composite lead as defined in claim 1, wherein said lead at liquid nitrogen temperature 77K has electric current carrying capability $10^3 - 10^6$ Ampere/cm^2.

8. A sintered ceramic composite lead as defined in claim 1, wherein said lead provides magnetic propulsion or levitation Meissner effect at least at liquid nitrogen temperature $\leq$ 77K.

9. A sintered ceramic composite lead as defined in claim 1, wherein said crystals are copper multi-oxide $YBa_2Cu_3O_{7-x}$ superconductor ceramic crystals constituting more than 90 mass percent of said lead and being thermally oxygenated, wherein $0 \leq x \leq 0.3$.

10. A sintered ceramic composite lead as defined in claim 9; wherein said lead is a said substrate coating strand, said substrate is *Ag* (silver) metal alloy continuous strand, said coating strand is flexible and has a total diameter of 0.1 – 1.5mm, and said coating strand provides

electric current carrying capability 1 – 100kA/cm^2 at liquid nitrogen temperature 77K.

11. A sintered ceramic composite lead as defined in claim 9; wherein said lead is a said substrate coated strand, said substrate is *NiCr* (nichrome) metal alloy continuous strand, said coating strand is flexible and has a total diameter of 40 – 100μm, and electric multi-strand wire being woven from said coating strands provides electric current carrying capability 10 – 20kA/cm^2 at liquid nitrogen temperature 77K.

12. A method of production of a sintered ceramic composite lead, comprising the silicone additive tailored thermo-chemical nanofabrication of 3D superconductive nano-architecture of the said lead and providing:

(A) a physical-chemical phase composition consisting of:

* nano-size superconductor ceramic grains composed of crystals and forming a basic phase elements;
* additional phase elements constituting nano-thick multi-oxide silicate glass films distributed within grain boundary areas between said grains;
* further phase elements selected from at least one group consisting of nano-size dope particle, modifier particle, and impurities particle groups, and a combination thereof and said further phase elements are distributed within said grain boundary areas between said grains; **and**

(B) a three dimensional grain-cell nanostructure comprising setting network and consisting of:

* said crystals with *c* - axes oriented substantially perpendicular to a direction of an electric current flux in said lead;